**Topics 03 – Periodicity (SL/HL 1)**

**Topic 3: Periodicity (6 hours)**  
**3.1 The periodic table - 1 hour**   
3.1.1 Describe the arrangement of elements in the periodic table in order of increasing atomic number. (2)   
3.1.2 Distinguish between the terms group and period.(2)   
3.1.3 Apply the relationship between the electron arrangement of elements and their position in the periodic table up to Z = 20. (2)   
3.1.4 Apply the relationship between the number of electrons in the highest occupied energy level for an element and its position in the periodic table. (2)   
**3.2 Physical properties - 2 hours**   
3.2.1 Define the terms first ionization energy and electronegativity. (1)   
3.2.2 Describe and explain the trends in atomic radii, ionic radii, first ionization energies, electronegativities and melting points for the alkali metals ( Li-->Cs ) and the halogens ( F -->I ). (3)   
3.2.3 Describe and explain the trends in atomic radii, ionic radii, first ionization energies and electronegativities for elements across period 3. (3)   
3.2.4 Compare the relative electronegativity values of two or more elements based on their positions in the periodic table. (3)   
  
**3.3 Chemical properties - 3 hours**   
3.3.1 Discuss the similarities and differences in the chemical properties of elements in the same group. (3)   
3.3.2 Discuss the changes in nature, from ionic to covalent and from basic to acidic, of the oxides across period 3. (3)   
  
  
**Topic 13: Periodicity (4 hours)**   
**13.1 Trends across period 3 - 2 hours**   
13.1.1 Explain the physical states (under standard conditions) and electrical conductivity (in the molten state) of the chlorides and oxides of the elements in period 3 in terms of their bonding and structure. (3)   
13.1.2 Describe the reactions of chlorine and the chlorides referred to in 13.1.1 with water. (2)  
  
**13.2 First-row d-block elements - 2 hours**   
13.2.1 List the characteristic properties of transition elements. (1)   
13.2.2 Explain why Sc and Zn are not considered to be transition elements. (3)   
13.2.3 Explain the existence of variable oxidation number in ions of transition elements. (3)   
13.2.4 Define the term ligand. (1)   
13.2.5 Describe and explain the formation of complexes of d-block elements. (3)   
13.2.6 Explain why some complexes of d-block elements are colored. (3)   
13.2.7 State examples of the catalytic action of transition elements and their compounds. (1)   
13.2.8 Outline the economic significance of catalysts in the Contact and Haber processes. (2)